

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (currently amended) A system ~~(10)~~ to forecast the electrical conductivity of an anode ~~(12)~~ for aluminum production, the system ~~(10)~~ comprising:

an electromagnetic field emitting unit ~~(14,18)~~ to generate an excitation electromagnetic field;

at least one receiving coil ~~(20,22)~~ electromagnetically coupled to the electromagnetic field emitting unit ~~(14,18)~~;

a sensing device ~~(30)~~ connected to the receiving coil ~~(20,22)~~, the sensing device ~~(30)~~ outputting a signal indicative of a variation of the electromagnetic field received by the receiving coil ~~(20,22)~~ as the anode ~~(12)~~, or a sample thereof, passes inside the receiving coil ~~(20,22)~~;

a carriage unit ~~(40)~~ to move the anode ~~(12)~~, or the sample thereof, at least relative to the receiving coil ~~(20,22)~~; and

means for calculating a value indicative of the electrical conductivity of the anode ~~(12)~~ using at least the signal from the sensing device ~~(30)~~ and signals previously obtained using reference anodes;

the system ~~(10)~~ being characterized in that:

the signal from the sensing device ~~(30)~~ is obtained using the anode ~~(12)~~ before baking thereof;

the value obtained from the means for calculating is indicative of the electrical conductivity of the anode ~~(12)~~ after baking thereof.

2. (currently amended) The system ~~(10)~~ as defined in claim 1, characterized in that two opposite receiving coils ~~(20,22)~~ are provided with reference to the electromagnetic field emitting unit ~~(14,18)~~, both receiving coils ~~(20,22)~~ being in serial connection with each other.

3. (currently amended) The system ~~(10)~~ as defined in claim 2, characterized in that the receiving coils ~~(20,22)~~ have oppositely wound coils, both coils having substantially identical characteristics and being coaxially positioned with reference to a main axis ~~(M)~~.

4. (currently amended) The system ~~(10)~~ as defined in claim 3, characterized in that the electromagnetic field emitting unit ~~(14,18)~~ includes an AC generator ~~(18)~~ connected to an emitting coil ~~(14)~~.

5. (currently amended) The system ~~(10)~~ as defined in claim 4, where in the AC generator ~~(18)~~ operates at a frequency between 100 and 10,000 Hertz.

6. (currently amended) The system (10) as defined in claim 4 ~~or 5~~, characterized in that the emitting coil (14) is substantially coaxial with reference to the main axis ~~(14)~~.

7. (currently amended) The system (10) as defined in claim 4, ~~5 or 6~~, characterized in that the receiving coils ~~(20,22)~~ are substantially equidistant with reference to the emitting coil ~~(14)~~.

8. (currently amended) The system (10) as defined in claim 1 ~~any one of claims 1 to 7~~, characterized in that the sensing device (30) includes an ammeter.

9. (currently amended) The system (10) as defined in claim 1 ~~any one of claims 1 to 8~~, characterized in that the means for calculating the value indicative of the electrical conductivity of the anode (12) include a computer, the computer (32) having a memory (34) in which are recorded the signals previously obtained using the reference anodes (12).

10. (currently amended) A method for forecasting the electrical conductivity of an anode ~~(12)~~ for aluminum production, the method comprising:

generating an excitation electromagnetic field;

moving the anode (12), or a sample thereof, within at least one receiving coil (20,22) electromagnetically coupled to the electromagnetic field;

sensing a variation in the electromagnetic field received by the at least one receiving coil (20,22) and outputting a signal indicative thereof; and

calculating a value indicative of the electrical conductivity of the anode (12);

the method being characterized in that:

the anode (12), or the sample thereof, is moved within the at least one receiving coil (20,22) before baking of the anode (12);

the value indicative of the electrical conductivity of the anode (12) is calculated using the signal indicative of the variation in the electromagnetic field received by the at least one receiving coil (20,22) and previously-recorded signals obtained with reference anodes before baking thereof and for which the electrical conductivity has also been measured after baking; and

the calculated value is indicative of the electrical conductivity of the anode (12) after baking.

11. (currently amended) The method as defined in claim 10, characterized in that it further comprises:

comparing the value indicative of the electrical conductivity of the anode (12) to a threshold value; and

discarding the anode (12) before baking based on the fact that its forecasted electrical conductivity is below the threshold value.

12. (currently amended) The method as defined in claim 11, characterized in that it further comprises:

modifying composition of subsequently-manufactured crude anodes (12) based on the forecasted electrical conductivity of the anode (12)—so as to optimize the electrical conductivity of the subsequently-manufactured anodes (12) after baking.

13. (currently amended) The method as defined in claim 10 ~~any one of claims 10 to 12~~, characterized in that the value indicative of the electrical conductivity of the anode (12) is calculated using a value indicative of a maximum variation in the signal.

14. (currently amended) A method of forecasting the electrical conductivity of an anode (12) for aluminum production before baking thereof, the method being characterized in that it comprises:

sensing a variation caused by a first reference crude anode to an excitation electromagnetic field received by at least one receiving coil (20,22);

sensing the variation for a plurality of other reference crude anodes having various compositions;

measuring the electrical conductivity of the reference anodes after baking thereof;
determining a correlation between the sensed variations for the reference anodes before baking and their electrical conductivity measured after baking;
sensing the variation for an additional anode (12) before baking thereof; and
calculating a value indicative of the electrical conductivity of the additional anode (12) using the correlation between the sensed variations for the reference anodes before baking and their measured electrical conductivity after baking.

15. (currently amended) The method as defined in claim 14, characterized in that it further comprises:

comparing the forecasted electrical conductivity of the additional anode (12) to a threshold value; and

discarding the additional anode (12) before baking based on the fact that its forecasted electrical conductivity is below the threshold value.

16. (currently amended) The method as defined in claim 14 or 15, characterized in that it further comprises:

modifying the composition of subsequently-manufactured additional crude anodes (12) based on the forecasted electrical conductivity of the additional anode (12) in effort to meet the electrical conductivity threshold.

17. (currently amended) The method as defined in claim 14 ~~any one of claims 14 to 16~~, characterized in that the value indicative of the electrical conductivity of the additional anode (12) is calculated using a value indicative a maximum variation in the signal.